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Economic Analysis of Tobacco Profitability in District Swabi

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Abstract
Economic profitability of production of tobacco in Swabi, KPK, Pakistan was investigated through the structured questionnaire and personal interview method during 2013 from five purposively selected villages. 65 sampled respondents were investigated during the study. Farm budgeting technique was applied to estimate cost, gross return and net revenue. Economic analysis revealed that the average cost was Rs. 348637.18 acre^{-1} with the average tobacco output estimate to be 3,244.73 kg acre^{-1} and average gross revenue of Rs. 430348.54 acre^{-1}, whereas the average net revenue (net profit) was estimated to be Rs. 81711.36 acre^{-1}. The regression analysis of profit function displays that cost, quantity of yield and price of the yield were the main factors of profit (net revenue) determination.
Keywords: Tobacco;Net revenue;Cost of production; Regression.

INTRODUCTION

Tobacco (*Nicotiana tabacum L.*) production is an important lucrative innovativeness in Khyber Pakhtunkhwa. It has a countless potential in transforming the rural economy into the provincial economy and prosperous province (Hussain *et al.,* 2010). Irrespective of being labor-intensive crop (Faraz, 2003), Khyber Pakhtunkhwa has the capability to produce comparatively good class of tobacco, due to its proper climatic, agronomic and top soil situations according to specified demand across the country (Hussain *et al.,* 2010). Tobacco is grown for the consequent production of cigarettes, cigars, snuff, hookah and chewing purposes. This province donates 99% of tobacco to cigarette manufacturing industries. The average yield of tobacco in Pakistan in 2010 and 2011 was 2,138 kg ha^{-1} and 2,003.9 kg ha^{-1} respectively (Agricultural Statistics of Pakistan 2010 – 2011).

Tobacco plant is considered as wicked weed but still loved by many. Since 15th century this golden leaf crop is being utilized by human beings (Muhammad, 1975). Tobacco occupies a relatively small area (0.27%) of the total irrigated land in Pakistan, but it continues to be an essential component of state's economy.

Tobacco pays high taxes, earns foreign exchange, and hires many employees who earn relatively high incomes (Shah, 1991, Santoso, 1991, Anonymous, 2002). Like wheat, tobacco is one of the essential cash-crop of Pakistan as well as throughout the world. It is important due to the fact that about 30% of the Federal Government income earned from the CED (Custom and Excise Duties) is resulting from this source. Tobacco is one of the greatest per hectare gross valued out-turn crop as compared to other crops (Rahman *et al*., 2011).

In Pakistan, tobacco is produced on a wide range and contributes a huge amount of foreign exchange and excise duty and sales tax. Pakistan has received foreign exchange of 362.37 million in the year of 2001-02. (Qamar *et al*., 2006).

Keeping in view the supreme significance of tobacco crop as a major cash crop in Pakistan, the present study was formulated to find out the cost and net revenue from tobacco production in a specific area.

MATERIALS AND METHODS

The present study was conducted in district Swabi, Pakistan during the year 2013. The study was based on primary data (cross sectional) collected from tobacco growers. This area is most suitable for the tobacco production due to favorable environment, agronomic and soil conditions. Five villages were selected purposively for data collection viz. Jalbai, Manki, Mian Essa, Mughulri and Sher abad. These villages were selected with the kind cooperation of local residents and farmers. All the farmers in the district were considered as a population. A total of 135 farmers were personally interviewed as a sample for study, of which only 65 were used in the analysis. The rest were dropped because they did not have all the information required to estimate the profit function. Data collection was made through a well-structured interview schedule. The interview was based on various questions, including land holding, inputs used, total area under cultivation, total area under tobacco cultivation, total labor used, etc. For collecting the data, the farmers were interviewed in their farms and homes. The main purpose was to find how the cost of the various inputs effected the profitability of tobacco crop.

Method of data analysis:

Econometric-views (E-views) package was used to analyze the tobacco profit function. The following

procedures were applied.

Hypothetical modeling of cost and return of tobacco production:
Cost and revenues of tobacco production were measured by means of "Simple Budgeting Technique". The main objective of this was to recognize the significance of each factor in production of tobacco. It was used for valuation of net yield through profit function analysis.

Experimental modeling of cost and return of tobacco production:
Net return
According to Debertin (1986), former's profit (net returns) is determined as follow;

$$\Pi = TR - TC \quad \text{_____} \quad (1)$$

Where Π = net return, TR = total revenue and TC is total cost. The total revenue and cost are the combinations given hereby;

$TR = P * Q_0$ (P is price of output and Q is quantity of output)
$TC = \Sigma V_i * X_i$ (V is input price and X is input purchased)

Therefore

$$\Pi = PQ - VX \quad \text{_____} \quad (2)$$

Net revenue of tobacco produce was estimated through the above function in our study case.

Hypothetical modeling of profit function:
Former's profit (Net revenue) is the difference between total revenue (TR) and total cost (TC), (Debertin, 1986).
Therefore,

$\Pi = TR - TC$
$TR = P * Q_0$(P is price of output and Q is quantity of output)
$TC = \Sigma V_i * X_i$ (V is input price and X is input purchased)

Hence,
Equation (1) will be rewritten as:

$$\Pi = f(P, C, Q) = PQ_0 - V_i X_i \quad \text{_____} \quad (3)$$

Where:

Π = Profit (Net Returns)
P = Output price (Rs. Kg^{-1})
C = Cost of output produced (Rs. Kg^{-1})
Q = Quantity of tobacco output produced (kg)
TC = Total cost of tobacco production (Rs. $acre^{-1}$)
V_i = Input prices.
i = 1, 2, 3, 4,……,n.

Experimental modeling of tobacco profit function:
The experimental profit function of tobacco is specified as below.

$$\Pi = \beta_0 + \beta_1 P + \beta_2 C + \beta_3 Q + U \quad \text{_____} \quad (4)$$

The above model (equation) describes that profit (Π) is determined by three major factors, which are output price (P), output cost (C) and quantity of that output produced (Q). In the model "U" is random error term.This equation was used to analyze the profit (net return) of tobacco enterprise.

RESULTS AND DISCUSSIONS
The chapter comprised of two sections. Section A consist of the production cost, marketing cost, gross margin (total revenue) and profit (Net return) of tobacco enterprise while section B deals with description and estimation of profit function.

SECTION A
Cost of tobacco production
The major components of total cost of production were the fixed cost of land rent and the variable cost including cost of nursery raising, fertilizers, irrigation, cultural practices, pesticides and topping etc. Total average cost of these different inputs used in production and their application was calculated to be Rs. 172790.05 $acre^{-1}$ (table 1).

Cost of Nursery Raising
The total cost that experienced on nursery raising $acre^{-1}$ for the production of tobacco seedlings was calculated to be Rs.9586.27 which represents 5.55% of total cost of production $acre^{-1}$. Among the different nursery raising costs, the highest expenditure of Rs. 3989.82 was spent on labor for irrigation, whereas the lowest cost of Rs. 131.50 was spent on land preparation (table 1).

Land Rent

In the study area the cost incurred acre^{-1} of land rented on hire for production of tobacco crop was Rs. 48722.22 which represents 28.82% of the total production cost of tobacco (table 1).

Chemical Fertilizer Cost

The average total cost for chemical fertilizers was Rs. 62542.28 acre^{-1} which is 36.20% of the total production cost, themaximum share in all input costs incurred on production of tobacco. The fertilizers included urea, DAP, NPK and FYM among which the higher cost of about Rs. 32989.29 acre^{-1} was spent to purchase NPK. The expenditure for other fertilizers such as urea, FYM, DAP and their application cost per acre was Rs. 242.34, Rs. 9501.57, Rs. 8145.59 and Rs. 3791.17 respectively (table 1).

Cultural Practices, Irrigation, Pesticides and Topping Costs

The agronomic practices used in the production of tobacco acre^{-1} were field layout, hoeing, weeding, ridges, bullocks plough and so on. All these activities were needed to improve the yield of tobacco. The average total cost acre^{-1} of these different cultural practices wasRs. 15381.38, which represents 8.90% of total cost of production. Among these practices, the higher cost was due to transplantation which was Rs. 4966.56, while the lowest cost was tools depreciation, at Rs. 288.00acre^{-1}.A total cost of Rs. 6304.61 acre^{-1} was incurred on irrigation and labor used in irrigating process, which was 3.07% of the total cost of production. Cost of Pesticides and their application wereRs. 14,089.36 representing 8.15% of total production cost. Topping cost acre^{-1} included suckricides, herbicides and its amount was Rs. 13569.22, 7.85% of total cost of production acre^{-1}(Table 1).

Harvesting, processing and marketing costs

Table 2 indicates that the average total cost of marketing acre^{-1} was Rs. 175847.13, including leaves picking, loading/unloading, fuel wood, fireman/curer, grading, binding, moisturizing and transportation cost. This marketing cost represented 50.44% of the total cost of tobacco enterprise acre^{-1}, out of which the higher amount was due to fuel wood Rs. 68473.14 acre^{-1}, 38.94% of the total marketing cost of tobacco. Other major costs of marketing were curing, fireman and stringing, which were Rs. 18195.85, Rs. 13757.28 and Rs. 11973.77 acre^{-1} respectively, while their percentage contribution to total marketing cost acre^{-1} were 10.35%, 7.82% and 6.81%

Total tobacco production cost

Production cost acre^{-1} and market cost acre^{-1}constitutes total production cost of tobacco enterprise acre^{-1}. In the study area, these two values were Rs. 172790.05 acre^{-1} and Rs. 175847.13, leading to the total cost of tobacco enterprise of Rs. 348637.18 acre^{-1}(table 3).

Tobacco yield (leaf output)

Higher output of tobacco leaf yield depends on various inputs used. These important inputs comprised availability of best seed quality, chemical fertilizers, improved irrigation sources, pesticides used in production, plantation on time etc. Table 3 shows that as average the total of 3244.73 kg output (tobacco leaf) acre^{-1} was obtained from study area.

Gross and net revenue of tobacco crop

Tobacco is one of the major foundations of revenue for farmers of tobacco crop. Higher yield from tobacco crop depend upon farmer's awareness in different events relating to farming and also on farmer's investment in various inputs purchased.Table 3 indicates that a total of Rs. 430348.54 gross return acre^{-1} was obtained in the study area. Net return (profit) is equal to total gross return acre^{-1}less total cost acre^{-1}. From study area Rs. 81711.36 net return acre^{-1} was obtained which is calculated as under:

Net return =	Total gross return	-	Total cost
81711.36 =	430348.54	-	348637.18

SECTION B

Econometric analysis

Estimated results

The data pertaining to the estimated results of econometrics are presented in table 4. The value of F-statisticdefines the overall significance of the model/goodness of fit. In the study case as $F_{cal} > F_{tab} = 2.76$, shows that the model is totally significant. The value of R^2 of the model is 0.48 which is considered very well in cross sectional data analysis showing that 48% percent of total variations in dependent variable (net return) are explained by the explanatory variables included in the model. The sign of eachindependent variableshows their relationship to dependent variable. All these signs are in lineaccording to the economic theory. As $t_{cal} > t_{tab}$ =

1.67, therefore, the t-ratios of all the three explanatory variables confirms that, the profit (Π) is determined by per unit cost (C), production output (Q) and price of output per kilogram (P). All other inputs remaining the same, an increase of one rupee per kg cost (C) will decline net return by an amount of Rs. 0.09, producing an extra kg of output (Q) will increase total revenue by Rs. 22.56 whereas each extra unit of per kg price (P) will rise total net return by Rs. 435.37. The estimated profit function reveals that profit is considerably affected by the above three already mentioned determinants. However, a rise in price has amore significant contribution towards higher revenues for tobacco crop cultivators.

CONCLUSIONS AND RECOMMENDATIONS

In assessment of profit from tobacco production, the most costly input at production stage was NPK fertilizers, which costs Rs. 62542.28 acre^{-1} that shares a large portion 36.20% of total production cost. The second most costly item in production process was rent of hired land (Rs. 48722.22acre^{-1}) which share 28.20% of production cost. In marketing costs the two most costly items are fuel cost and curer cost which were Rs. 68473.14 and Rs. 18198.85 respectively.Their contributions to total marketing cost were 38.94% and 10.35% respectively. The total cost from tobacco enterprise was Rs. 348637.18 acre^{-1} and total gross return from tobacco output was Rs. 430348.54 acre^{-1}. The net returns (profit) of tobacco of tobacco formers was Rs. 81711.36 acre^{-1}.It is recommended that agricultural scientist should conduct investigation studies to expand tobacco seed varieties to improve higher profit from tobacco crop acre^{-1}. Since the rent of land is very expensive in the study area, therefore, the government may compensate farmers by reducing the prices of other inputs like fertilizer, quality seed etc. Policy should be formulated for constant input and output prices that is essential for satisfyinggreater tobacco yield.

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Table 1: Cost of production of tobacco in district Swabi (Rs. acre^{-1})

Items	Units	Quantity	Rate/unit	Cost	% share in TC
Land preparation	M.Hrs	0.38	346.05	131.50	0.08
Seed	Kgs	10.5	33.21	348.71	0.20
Fertilizer	Kgs	5.50	45.20	248.60	0.14
Weeding	MDs	7.93	230.64	1614.48	0.93
Pesticides	Rs.	--	--	271.67	0.16
Labor for irrigation	MDs	12.16	328.11	3989.82	2.31
Frost protection	Yards	23.00	129.63	2981.49	1.73
Nursery cost	**Rs.**	--	--	**9586.27**	**5.55**
Land rent	**Rs.**	--	--	**48722.22**	**28.20**
Land preparation	M.Hrs	11.62	677.48	7872.32	4.56
Urea	Kgs	17.31	14.00	242.34	0.14
DAP	Kgs	306.11	26.61	8145.59	4.710
NPK	Kgs	680.00	53.80	32989.29	19.10
FYM	Kgs	2.53	3755.56	9501.57	5.50
Application cost	M.Ds	10.17	372.78	3791.17	2.19
Fertilizer (NPK)	**Rs.**	--	--	**62542.28**	**36.20**
Field layout	M.Ds	3.56	351.67	1251.94	0.72
Hoeing/weeding	M.Ds	9.22	346.18	3191.78	1.85
Ridges	M.Ds	7.50	394.44	2958.30	1.71
Bullock's plough	M.Hrs	10.11	355.56	3594.71	2.08
Transplantation	M.Ds	14.56	341.11	4966.56	2.87
Gap filling	M.Ds	7.32	372.24	2724.80	1.57
Tools depreciation cost	Rs.	--	--	288.00	0.16
Cultural practices cost	**Rs.**	--	--	**18976.09**	**10.98**
Pesticide cost	Rs.	--	--	7546.78	4.37
Suckerside cost	Rs.	--	--	1433.87	0.83
Application cost	M.Ds	13.45	379.83	5108.71	2.95
Total pesticide cost	**Rs.**	--	--	**14089.36**	**8.15**
Water charges	Rs.	--	--	611.11	0.35
Labor cost	M.Ds	13.41	350.00	4693.5	2.72
Irrigation cost	**Rs.**	--	--	**5304.61**	**3.07**
Suckering cost	M.Ds	13.39	390.00	5222.10	3.02
Herbicides	Rs.	--	--	2775.50	1.61
Application cost	M.Ds	15.67	355.56	5571.62	3.22
Topping cost	**Rs.**	--	--	**13569.22**	**7.85**
Total production cost	**Rs.**	--	--	**172790.05**	**100.00**

TC = total cost

Table 2:Marketing cost of tobacco in district Swabi (Rs. acre^{-1}).

Items	Unit	Quantity	Rate/unit	Cost	% share
Leaves picking	M.Ds	22.61	650.00	14696.50	8.36
Transport to furnace	Rs.	--	--	8160.00	4.64
Stringing	M.Ds	19.33	619.44	11973.77	6.81
Loading	M.Ds	12.11	625.00	7568.75	4.30
Fuel wood cost	Kgs	5729.97	11.95	68473.14	38.94
Fireman cost	M.Ds	22.11	622.22	13757.28	7.82
Curer cost	M.Ds	29.78	611.11	18198.85	10.35
Moisturizing cost	M.Ds	7.78	616.67	4797.69	2.73
Grading cost	M.Ds	16.33	616.67	10070.22	5.72
Binding cost	M.Ds	10.53	617.65	6503.85	3.70
Transportation cost	Bale	68.61	48.89	3354.34	1.91
Unloading	M.Ds	10.61	627.78	6660.74	3.79
Marketing cost	Rs.	--	--	1232.00	0.70
Hired place rent	Rs.	--	--	400.00	0.23
Total marketing cost	**Rs.**	--	--	**175847.13**	**100.00**

Table 3: Total cost, yield, gross return and net return acre^{-1}

Yield acre^{-1}(kg)	Rate kg^{-1}	Total gross return	Total cost	Net return
3244.73	132.63	430348.54	348637.18	81711.36

Table 4. Regression analysis

Dependent variable: Profit (net return)

Variable name	Coefficients	Standard errors	t-values	P-values
Constant	-16755.30	26710.31	-0.63	0.53
Cost	-0.09	0.04	-2.53	0.01
Output	22.56	5.03	4.48	0.00
Price	435.47	94.15	4.62	0.00

R^2= 0.48, R^2(adjusted) =0.45, F-statistic=18.67

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